

THE
ONTARIO WATER RESOURCES
COMMISSION

WATER POLLUTION SURVEY

of the

TOWN OF BRUCE MINES

DISTRICT OF ALGOMA

1966

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DISTRICT OF ALGOMA

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Report on a water pollution
survey of the town of Bruce
Mines, district of Algoma.
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REPORT

on a

WATER POLLUTION SURVEY

of the

TOWN OF BRUCE MINES

District of Algoma

May 1966

DIVISION OF SANITARY ENGINEERING

R E P O R T

THE ONTARIO WATER RESOURCES COMMISSION

INTRODUCTION

A water pollution survey was carried out in the Town of Bruce Mines on May 4-5, 1966. Such surveys are performed routinely and upon request, by staff of the Commission, in an effort to locate and evaluate existing and potential sources of pollution and to assess water supply requirements.

This report consists of an interpretation of information gained from the examination and sampling of local watercourses, sewer outfalls and water supplies; a review of existing conditions with respect to waste treatment and water supply; and interviews with local and other officials.

I GENERAL

The Town of Bruce Mines is located on the north shore of Lake Huron (on the St. Joseph Channel) 40 miles east of the City of Sault Ste. Marie. The current population is 505 and total assessment is in excess of \$600,000.

The town has a unique and interesting history having been the site of the first producing copper mine in Canada in 1842. In 1876, the mines were closed and the population began a gradual decline. Two major fires in this century have destroyed large portions of the old town. There is, at present, no industrial development.

The municipality stretches for some 2 miles along the shoreline and centres around Highway 17. Commercial properties front the highway with rear lots extending 500 feet south through marsh flats to the lake. The major residential area extends to the north with some

development along the shoreline both to the east and west. Jordan Creek passes through the town emptying into the lake from the north.

Clay and bouldery loam soil overburdens the granite and diabase bedrock with a number of outcroppings in the eastern portions of the town. With the exception of outcroppings, overburden varies from 6 feet to 70 feet in depth. Examination of the town indicated that high water table conditions exist resulting in ground saturation and a continual flow in drainage courses. All drainage is to the lake at the south.

From an economic standpoint, the municipality has prospects for future development. Some growth is to take place in the school facilities. An anticipated expansion in the school population from 350 to 1100 could result from the consolidation of several school areas.

II WATER USES

1. Domestic Water Supply

(a) Present Conditions

There is at present, no municipal water supply. Individual properties are served by dug or drilled wells or in some cases with water drawn from the lake.

With the high water table, dug wells at a depth of 10-12 feet generally provide an adequate supply of water. Such supplies are generally susceptible to pollution from both surface and sub-surface sources. OWRC records on drilled wells in the community indicate that water is usually encountered at an average depth of 38 feet with static levels of less than 5 feet. Test pumping rates of 200-300 gph are reported in most instances and the water is hard but generally of good quality.

Lake Huron water is used at six locations in the town. Although little detail is available on these supplies, most are believed to be equipped with chlorinating facilities.

(b) Potential Sources

Two sources exist as potential sources of a municipal water supply system; namely, a surface supply from Lake Huron and ground water from a suitable well.

In the first instance, a limitless source of generally good quality is available. Fluctuating conditions in the lake would exist as the result of weather conditions and to some extent would influence the type of treatment works required. Minimal treatment would require chlorination facilities whereas unusual conditions in the lake might suggest the need for filtration or sedimentation devices.

With regard to ground water sources, several test wells were drilled in the north-west portion of the town in 1959. OWRC records on these wells indicate that test pumping produced 500 gallons per hour for 48 hours from each well. This information is not sufficient for a full assessment of ground water potential and any consideration of a well source would require a more extensive test drilling programme.

2. Recreational Uses

The town's location on the St. Joseph Channel makes it a moderately active tourist centre during the summer months. Swimming, boating and fishing are popular pastimes and cottage development along the shoreline and neighbouring islands has resulted. The prevention of pollution in the lake is therefore essential.

III WATER POLLUTION

1. Sanitary Waste Disposal

(a) Existing Conditions

The disposal of domestic wastes in the town is the responsibility of the individual property owner. This survey found a number of methods in use, the most common of which is the septic tank and tile bed system. In some cases, outdoor privies are still used while cesspools were in evidence at other locations.

Lot sizes in the town average 7200 square feet, less than half the recommended minimum size where no municipal water or sewer service exists. As a result, septic tank systems are generally installed with less than 200 feet of tile bed and without inspection by any health authority. The unusual soil conditions and the high water table also provide additional handicaps to the satisfactory operation of such systems. This combination of factors results in up to 80% of the disposal systems having a discharge of some sort to either street ditches or Jordan Creek. These discharges consist of laundry wastes, septic tank effluent from flooded tile fields and washwaters from kitchen sinks. Particular problems were noted at both schools, the community hall, several tourist establishments and a number of retail outlets. Three storm drains in the commercial district are known to have connections from private disposal systems.

(b) Proposed Sewage Works

There has been, to date, no proposal for the development of sewage works in the town.

2. Refuse Disposal

The town maintains a disposal site for refuse at the eastern limits of the municipality. Open dumping is practised and

although the operation is susceptible to rodent infestation, there appears to be no danger of pollution of surface or ground waters.

3. Discussion of Sample Analyses

In an attempt to evaluate the quality of water supplies and the extent of pollution, samples were taken from various homes and establishments and from ditches and the creek in the town. The results of laboratory analyses are discussed under separate headings.

(a) Water Supply Samples

Laboratory analyses are appended for four samples. All are satisfactory from a bacteriological standpoint.

Chemically, the hardness is slightly in excess of the desirable limits but the water quality is generally satisfactory.

(b) Sewage and Surface Water Samples

The significance of analyses of samples from the water-courses is outlined in the Appendix. Briefly, high coliform organism counts particularly when accompanied by BOD values in excess of 4.0 ppm are indicative of domestic pollution. On the basis of the results appended, there is evidence of contamination in the creek and in several street ditches.

SUMMARY AND CONCLUSIONS

A water pollution survey of the Town of Bruce Mines was conducted on May 4, 5, 1966. The results of field examination and laboratory analysis of samples indicate the following:

With respect to water supply - on the basis of a limited number of samples - ground and surface water supplies appear to be satisfactory. However, the existence of sub-surface disposal systems in less than ideal soil conditions could easily result in serious contamination of individual wells particularly those of the shallow, dug variety.

Ditches and other watercourses throughout the municipality bore visual evidence of contamination by domestic sewage. Laboratory analyses of samples from seven random locations confirm that pollution from such sources does occur.

RECOMMENDATION

It is recommended that municipal water and sewer services be provided.

Approved by:



G.H. Mills, P.Eng.,
District Engineer,
Division of Sanitary Engineering.

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TABLE I
TOWN OF BRUCE MINES

<u>Lab. No.</u>	<u>Location</u>	<u>Date</u>	<u>Hardness as CaCO₃</u>	<u>Alkalinity as CaCO₃</u>	<u>Iron as Fe</u>	<u>Chloride as Cl</u>	<u>pH at Lab.</u>	<u>Coliforms per 100 ml</u>
1.	Garnet Motel Taylor St.	May 5/66	288	281	0.17	19	8.0	0
2.	Bayview Hotel	May 5/66	216	210	0.07	34	7.6	0
3.	Mrs. Rymal Crawford St.	May 5/66	326	311	0.09	8	7.5	0
4.	Copper Kettle Restaurant	May 5/66						0

TABLE II
TOWN OF BRUCE MINES

<u>Lab. No.</u>	<u>Location</u>	<u>Date</u>	<u>5-Day BOD (ppm)</u>	<u>Total (ppm)</u>	<u>Solids Susp. (ppm)</u>	<u>Diss. (ppm)</u>	<u>Coliforms per 100 ml</u>
1.	Storm Drain - Rear of Hardware	May 5/66	13	646	18	628	<4
2.	Ditch Drain - Opp. Lot 114	May 5/66	2.4	202	7	195	76
3.	Jordan Creek - at Hwy. 17	May 5/66	1.6	114	5	109	25000
4.	Jordan Creek - at Desbarats Street	May 5/66	1.0	120	1	119	1750
5.	Street Ditch - Crawford St. - South of Tarbutt	May 5/66	12	422	44	378	760000
6.	Street Ditch - Desbarats St. - West of Prout	May 5/66	1.6	1078	5	1073	100
7.	Street Ditch - Hwy. 561 - Opposite Public School	May 5/66	3.6	282	12	270	32000

APPENDIX

EXPLANATION AND SIGNIFICANCE OF LABORATORY ANALYSES

ALL THE LABORATORY TESTS INCLUDED IN THIS REPORT WERE PERFORMED AT THE ONTARIO WATER RESOURCES COMMISSION LABORATORY IN TORONTO.

A. BACTERIOLOGICAL EXAMINATION

THE MEMBRANE FILTER TECHNIQUE IS USED TO OBTAIN A DIRECT ENUMERATION OF COLIFORM ORGANISMS. THESE ORGANISMS ARE NORMAL INHABITANTS OF THE INTESTINES OF MAN AND OTHER WARM-BLOODED ANIMALS. THEY ARE ALWAYS PRESENT IN LARGE NUMBERS IN SEWAGE AND ARE GENERALLY MINIMAL IN OTHER WATER POLLUTANTS.

THE RESULTS OF THE EXAMINATIONS ARE REPORTED AS "M.F. COLIFORM COUNT PER 100 ML".

THE COMMISSION'S OBJECTIVE FOR STREAM SANITATION IS A COLIFORM DENSITY OF NOT GREATER THAN 2,400 ORGANISMS PER 100 ML.

B. SANITARY CHEMICAL ANALYSES

BIOCHEMICAL OXYGEN DEMAND (BOD):

BIOCHEMICAL OXYGEN DEMAND IS REPORTED IN PARTS PER MILLION (PPM), AND IS AN INDICATION OF THE AMOUNT OF OXYGEN REQUIRED FOR THE STABILIZATION OF DECOMPOSABLE ORGANIC MATTER IN THE WATER. THE COMPLETION OF THE LABORATORY TEST REQUIRES FIVE DAYS, UNDER THE CONTROLLED INCUBATION TEMPERATURE OF 20°C.

THE COMMISSION OBJECTIVE FOR STREAM WATER QUALITY IS AN UPPER LIMIT OF 4 PPM.

SOLIDS:

THE VALUE FOR TOTAL SOLIDS, EXPRESSED IN PARTS PER MILLION (PPM), IS THE SUM OF THE VALUES FOR THE SUSPENDED AND THE DISSOLVED MATTER IN THE WATER. THE CONCENTRATION OF SUSPENDED SOLIDS IS GENERALLY THE MOST SIGNIFICANT OF THE SOLIDS ANALYSES IN REGARD TO STREAM WATER QUALITY.

THE EFFECTS OF SUSPENDED SOLIDS IN WATER ARE REFLECTED IN DIFFICULTIES ASSOCIATED WITH WATER PURIFICATION, DEPOSITIONS IN STREAMS, AND INJURY TO THE HABITAT OF FISH.

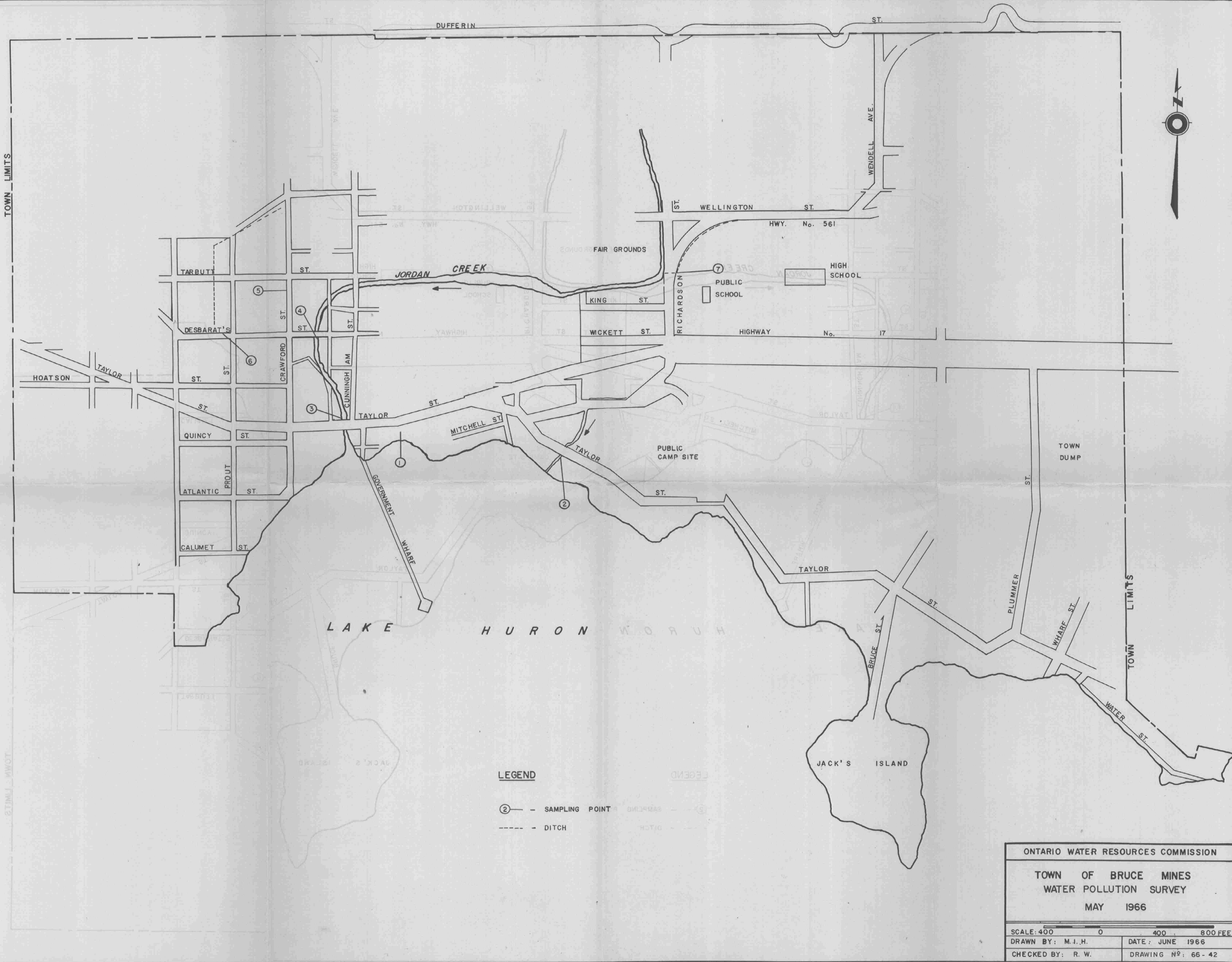
WHERE SUSPENDED SOLIDS VALUES ARE LESS THAN 20 PPM LABORATORY DIFFICULTIES ARE EXPERIENCED AND THE TURBIDITY IS DETERMINED INSTEAD.

TURBIDITY:

TURBIDITY IS CAUSED BY THE PRESENCE OF SUSPENDED MATTER, SUCH AS CLAY, SILT, FINELY DIVIDED ORGANIC MATTER, PLANKTON AND OTHER MICROSCOPIC ORGANISMS IN WATER. IT IS AN EXPRESSION OF THE OPTICAL PROPERTY OF A SAMPLE AND RESULTS ARE REPORTED IN "SILICA UNITS".

TOWN LIMITS

TOWN LIMITS



LEGEND

- ② - SAMPLING POINT
- DITCH

ONTARIO WATER RESOURCES COMMISSION

TOWN OF BRUCE MINES
WATER POLLUTION SURVEY
MAY 1966

SCALE: 400 0 400 800 FEET
DRAWN BY: M.I.H. DATE: JUNE 1966
CHECKED BY: R.W. DRAWING NO: 66-42